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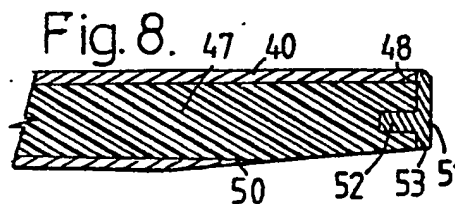
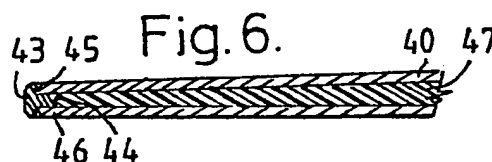
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(54) Cue

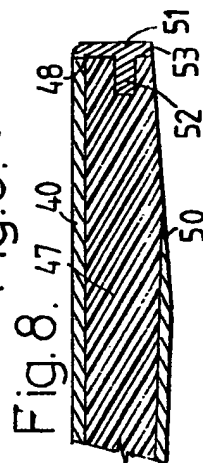
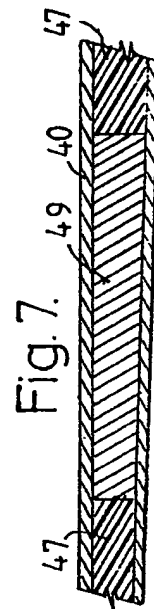
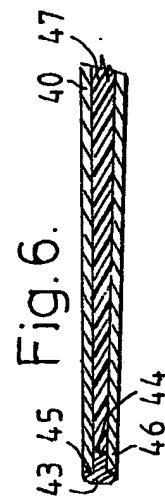
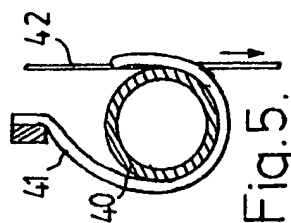
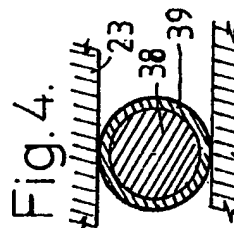
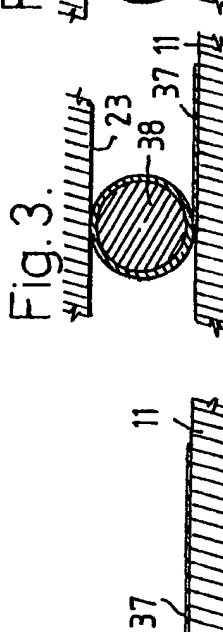
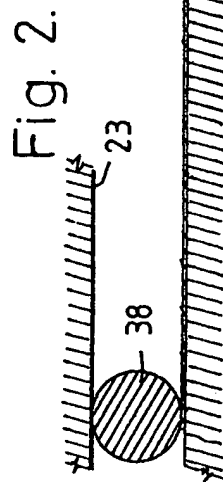
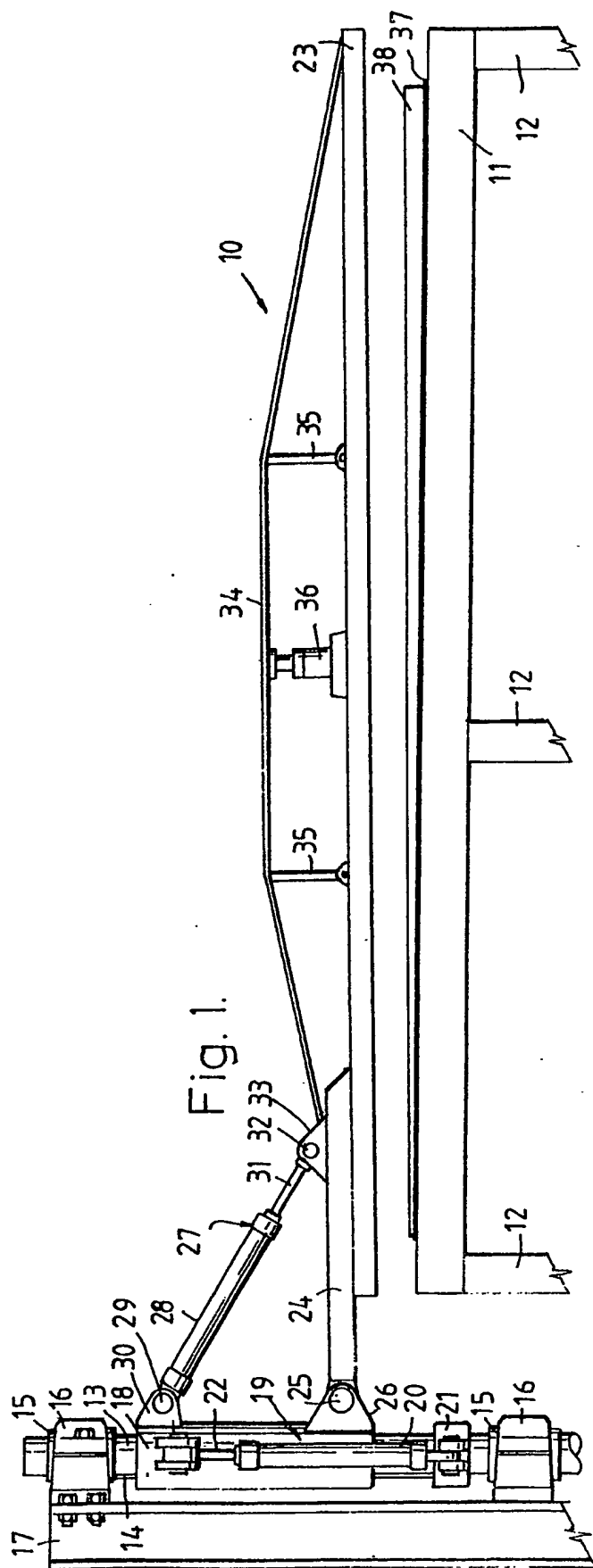
(57) A billiard cue has a body 40 of
fibre-glass, boron or plastics material

filled with foam, cloth and/or flock 47.

A rubber-like silicon weight 49 is
fitted in the body and the body is
closed by a striking tip 43 and butt
cap 51.



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SPECIFICATION Improvements in or relating to table games' cues

This invention relates to cues for billiards,
5 snooker, pool or like table games.

In the table games of billiards, snooker and pool, or their derivatives, e.g. "Eight-ball", "Kelly pool", wooden cues have been used. While such cues are generally acceptable for an amateur
10 standard of play, they are not fully acceptable at the professional and semi-professional level.

The major problem with the wooden cues presently available is that they tend to warp and/or bend due to changes in heat and/or humidity, or as
15 the wood undergoes further seasoning. Most of the cues sold in Australia are imported, e.g. from England and Canada and experience has shown that up to 75% of the cues in a particular consignment may have become warped or bent in transit. As such cues cannot be used for accurate
20 shots, they cannot be sold to professional players but must be either returned to the manufacturer or placed on sale at a reduced price in the hope that they will be purchased by unsuspecting
25 purchasers.

It is desirable to provide a cue which will not warp or bend in transit or use, which is semi-rigid to eliminate or reduce flexing of the tip when a ball is struck off centre, and/or which can be easily
30 manufactured, e.g. in a range of weights, lengths and finishes to suit a particular purchaser's requirements.

In one aspect, the present invention resides in a cue for table games including:
35 a tubular body of fibreglass or plastics material generally convergently tapering from a butt end to a tip end;
a butt cap and a striking tip closing the butt end and tip end respectively;

40 weight means fixed in the body; and
packing means filling the interior of the body.

The tubular body may be formed from pre-catalysed colour impregnated fibreglass cloth (e.g. a combination of fibreglass cloth and S-glass
45 cloth) or carbon-fibre impregnated fibreglass cloth) or injection moulded in fibreglass, Boron, high impact styrene or polyester or like plastics material, e.g. glass reinforced plastic (GRP).

The butt cap, which may be glued in position,
50 may be formed from polyester resin, injection moulded plastic, moulded rubber or urethane or cast and machined metal, while the striking tip may be formed from polyester resin or injection moulded high impact polyester or other suitable
55 materials.

Preferably the weight means is provided approximately one-third of the length of the cue from the butt end. While lead may be used, it is preferred to use a rubber-like silicon material sold
60 under the trade mark "PROMOULD". In most applications, the weight will be in the range of 450—540 grams (16—19 ounces).

Preferably the body of the cue is filled with polyurethane or similar foam material or cloth

65 and/or flock. The filling is packed and rammed until the cue emits the required sound, i.e. a sound comparable with a wooden cue, when a ball is struck.

Preferably a 2-pot epoxy resin or similar coating
70 is applied at the butt end to colour the cue to suit a purchaser's taste.

Splicing, in the form of a 1—2 mm thick decal may be applied also to the butt end. A portion of the butt end may be non-circular to form a planar
75 panel, to which may be applied a trade mark or any descriptive material.

In a second aspect, the present invention resides in a method of manufacturing a cue for table games including the steps of:

80 (a) forming a tubular body blank of fibreglass or plastics material, said body blank being generally convergent from the butt end to the tip end of the blank;

(b) securely fixing a weight means in the body
85 blank;

(c) filling the interior of the body blank with packing means; and

(d) securing a butt cap and a striking tip to the butt end and tip end respectively to close the
90 body.

In one preferred embodiment, step (a) is carried out by injection moulding the blank in fibreglass, Boron, high impact styrene or polyester or glass reinforced plastic (G.R.P.). In another embodiment,
95 pre-catalysed fibreglass cloth is wrapped around a mandrel under applied pressure and heat, wrapped in cellophane tape under tension and baked to catalyse the resins in the fibreglass.

Preferably, in a further step (e), the outer
100 surface of the blank is given a smooth, polished surface by passing the body blank past a sanding belt or disc.

Preferably step (c) is separated into two sub-steps (c1) and (c2). Sub-step (c1), which is carried
105 out before step (b), involves filling the body blank for approximately two-thirds of its length from the tip end. Sub-step (c2) is carried out after step (b) to complete filling of the body blank.

Preferably the method includes one or more of
110 the further steps of:

(f) dipping the butt end of the cue in a two-pot coloured epoxy resin mix;

(g) applying a coloured splicing to the butt end of the cue;

115 (h) applying any trade marks, labels or decals to the body of the cue.

To enable the invention to be fully understood, a preferred embodiment will now be described with reference to the accompanying drawings, in

120 which:

FIG. 1 is a side view of the press used in the manufacture of the body blanks;

FIGS. 2, 3 and 4 are sectional end views of progressive steps in the manufacture of a blank;

125 FIG. 5 is a sectional end view of the sanding step in the blank manufacture;

FIGS. 6, 7 and 8 are sectional views of the tip end, weight and butt end portions of a completed cue.

The blank forming press 10 has a heated, horizontal workbench 11 (section shaped in plan), mounted on fixed supports 12. A vertical shaft 13, with a key flange 14, is journaled in bearings 15 supported in spaced bearing caps 16 mounted on a vertical support pillar 17 at centre of radius of the workbench 11. A hydraulic ram (not shown) is connected to a crank arm (not shown) on the lower end of the shaft 13 to rotate the latter in either direction relative to the workbench 11 and pillar 17.

A sliding block 18 is slidably, non-rotatably keyed on the shaft 13. A double-acting hydraulic ram 19 has its cylinder 20 mounted on a collar 21 fixed on the shaft 13 and its piston rod 22 connected to the sliding block 18. By extension or retraction of the hydraulic ram 19, the sliding block 18 may be raised or lowered on the shaft 13.

The heated top platen 23 of the press is pivotally connected to the lower end of the sliding block 18 by a connecting arm 24 journaled on pivot pin 25 fixed between a pair of flanges 26. A hydraulic ram 27 has its cylinder 28 pivotally mounted on a pivot pin 29 fixed between a pair of flanges 30 at the upper end of the sliding block. The piston rod 31 of the ram 27 is pivotally connected to the connecting arm 24 via pivot pin 32 and flanges 33. By extension and retraction of the hydraulic ram 27, the angular relationship between the top platen 23 and shaft 13, and thereby between the top platen 23 and workbench 11, may be varied.

A top frame 34 interconnects the inner and outer ends of the top platen 23. Struts 35, pivoted at their lower ends, interconnect the top frame 34 and top platen 23 intermediate the length of the latter. A hydraulic- or screw-jack 36 is fitted between the top frame and top platen and by extension of the jack, the top platen is bent or bowed to have a non-planar pressface.

Referring to FIGS. 1 and 2, pre-catalysed colour impregnated fibreglass cloth 37 (e.g. a combination of fibreglass cloth and S-glass cloth) is cut to the required shape and is laid on the workbench 11. A preformed mandrel 38 is laid on the workbench 11 engaging one longitudinal edge of the cloth 37. The workbench 11 is heated.

Hydraulic ram 27 is retracted so that the undersurface of the top platen 23 is parallel with the upper surface of the mandrel 38. Hydraulic jack 36 is extended if the resultant cue is not to have a constant taper along its length.

Hydraulic ram 19 is retracted until the top platen 23 engages the mandrel 38 with moderate pressure. Top platen 23 is then heated.

The shaft 13 is rotated to roll the mandrel 38 over the cloth 37 until the mandrel has completed approximately one half revolution. The pressure on the mandrel is further increased by further retraction of the ram 19. The shaft 13 is further rotated to roll the mandrel over the cloth 37 to progressively roll the cloth about the mandrel (see FIGS. 3 and 4) to form a primary blank 39. The mandrel/primary blank combination is removed

from the press and is plated in a second machine where the mandrel is placed between centres and rotated. Cellophane (Registered Trade Mark) tape is progressively wound onto the primary blank under tension to apply pressure to the primary blank and to prevent the escape of any resin from the cloth.

This combination is placed in a furnace and the resins are baked and catalysed to form a semi-rigid tubular secondary blank 40.

The combination is removed from the furnace, the cellophane tape unwrapped and the mandrel 38 removed.

The secondary blank 40 is laid in a series of cradles 41 in a sanding machine having a sanding belt 42, the belt end of the blank 40 adjacent the belt 42. The belt is set in operation and the outer surface of the blank 40 is sanded as the blank is rotated and advanced past the belt by the taper in the blank.

The sanded blank 40 is now ready for assembly into the completed cue.

Striking tip 43, moulded in high impact polyester or polyester resin, has a rearwardly projecting pin 44 surrounded by a peripheral abutment face 45. The pin 44 is coated with a suitable glue and inserted in the tip end 46 of the blank until the abutment face 45 engages the end face of the tip end 46 and the glue is allowed to set.

Filling 47, e.g. polyurethane, cloth and/or flock, is rammed down the length of the blank 40 from the butt end 48 until the blank is firmly packed for approximately two-thirds of its length.

A premeasured weight of "PROMOULD" 49 (trade mark), a rubber-like silicon, is poured into the blank 40 and allowed to set, the "PROMOULD" being provided to weight the cue to suit the user's preference.

The butt end 48 of the blank has a portion 50 removed at an angle to the axis of the blank.

The remainder of the blank 40 is packed with filling 47.

Butt cap 51, of moulded rubber, has a pin 52 surrounded by a peripheral abutment face 53. The pin 52 is coated with glue and the butt cap 51 is positioned with the pin 52 engaged in the filling 47 and the abutment face 53 engaging the butt end 48 and filling 47.

When the glue has set, the cue, for approximately one-third of its length at the butt end, is dipped in a coloured 2-pot epoxy resin mix to provide a hard, coloured protective coating. For appearance, splicing (not shown) in the form of a 1—2 mm thick decal is applied to the butt end of the cue. Any trade marks or identification material may be applied to the completed cue.

In use, the completed cue will be found to remain straight and not warp or bend. The combination of the substantially rigid blank 40 and filling 47 ensures that the tip end of the cue is substantially rigid and will not flex excessively when a ball is struck off-centre. The filling 47 is rammed into the cue so that, on striking a ball, the sound emitted by the cue will be comparable with

the sound from a top quality wooden cue.

With the passing of time, no warping or bending due to heat, humidity and/or seasoning effects will be noted and the cue will play

consistently throughout its (long) lifetime.

It will be readily apparent to the skilled addressee that the blank 40 may be formed by injection moulding techniques from fibreglass, Boron, high impact styrene or polyester or glass reinforced plastics.

Because of the high strength of the material forming the blank 40, and the reinforcing of the filling 47, cues with much finer, but more rigid, tip ends than possible with wooden cues are easily manufactured. If required, at least a portion of the tip end may be parallel to reduce or eliminate any lateral movement of the cue on a bridge.

The cues, and the methods of manufacturing same, described above are by way of illustrative examples only and various modifications and variations may be made to these without departing from the scope of the present invention.

CLAIMS

1. A cue for table games including:
 - 25 a tubular body of fibreglass or plastics material generally convergently tapering from a butt end to a tip end;
 - a butt cap and a striking tip closing the butt end and tip end respectively;
 - 30 weight means fixed in the body; and
 - packing means filling the interior of the body.
 2. A cue as claimed in Claim 1 wherein the body is substantially rigid and is formed from pre-catalysed fibreglass cloth which is shaped on a
 - 35 mandrel and catalysed.
 3. A cue as claimed in Claim 1 wherein:
 - the body is substantially rigid and is formed of injection moulded fibreglass, Boron, high impact styrene or polyester, or glass reinforced plastics
 - 40 material.
 4. A cue as claimed in any one of Claims 1 to 3 wherein:
 - the butt cap is formed from polyester resin, injection moulded plastics material, moulded
 - 45 rubber or urethane or cast and machined metal;
 - the striking tip is formed from high impact polyester or polyester resin;
 - said butt cap and said striking tip being fitted and glued to the butt end and tip end respectively
 - 50 of the body.
 5. A cue as claimed in any one of Claims 1 to 4 wherein:
 - the weight means is formed of rubber-like silicon material and is fixed in the body
 - 55 approximately one-third of the length of the body

from the butt end; and

the packing means is formed of polyurethane or cloth and/or flock firmly packed to completely fill the interior of the body and to increase the rigidity of the body.

6. A cue as claimed in any one of Claims 1 to 5 wherein:

- at least the butt end of the cue is coated by an epoxy resin.

7. A method of manufacturing a cue for table games including the steps of:

- (a) forming a tubular body blank of fibreglass or plastics material, said blank being generally convergently tapering from the butt end to the tip
- 70 end of the blank;
- (b) securely fixing weight means in the body blank;
- (c) filling the interior of the body blank with packing means; and
- 75 (d) securing a butt cap and a striking tip to the butt end and a tip end respectively to close the body.

8. A method as claimed in Claim 7 wherein step (a) includes:

80 wrapping pre-catalysed fibreglass cloth around a mandrel under applied pressure and heat; wrapping cellophane tape around the cloth under tension; and catalysing the resins in the fibreglass cloth.

9. A method as claimed in Claim 7 wherein step (a) includes:

- injection moulding the blank from fibreglass, Boron, high impact styrene or polyester, or glass reinforced plastic.

10. A method as claimed in any one of Claims 7 to 9 wherein step (c) is separated into sub-steps (c1) and (c2) wherein:

- sub-step (c1) is carried out before step (b) and comprises filling approximately two-thirds of the
- 95 body with the packings means; and
- sub-step (c2) is carried out after step (b) and comprises filling the remaining volume of the body blank.

11. A method as claimed in any one of Claims 7 to 10 and including the further steps of:

- (e) sanding the outer surface of the body blank to a smooth finish;
- (f) dipping the butt end in a coloured epoxy resin mix; and
- 105 (g) applying a coloured splicing to the butt end.

12. A cue for table games substantially as hereinbefore described with reference to FIGS. 2 to 8 of the accompanying drawings.

13. A method of manufacturing a cue for table games substantially as hereinbefore described with reference to FIGS. 1 to 8 of the accompanying drawings.